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I hereby certify that this correspondence sufficient postage as first class mail in a the date shown below. Typed or printed name	e is being facs n envelope ac	CATE OF TRANSMISSI imile transmitted to the USPTO ddressed to: Commissioner for	or deposited with the	United :	States Postal Service with andria, VA 22313-1450 on
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Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT (

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Application Number	09/609,567
Filing Date	June 30, 2000
First Named Inventor	Robert D. Bateman RECEIVED
Examiner Name	T. Thai 00T 0 1 2002
Art Unit	2186 OCT 0 1 2003
Attorney Docket No.	042390.P9220 Technology Center 21

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SUBMITTED BY

Name (Print/Type) Kenneth M. Seddon Registration No. (Attornev/Agent) 43,105 Telephone 480-554-9732

Signature Wenneth W. Seddon Date September 22, 2003

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re application of:)	September 22, 2003	RECEIVED
Robert D. Bateman)		OCT 0 1 2003
)	To	echnology Center 2100
Serial No.: 09/609,567)	Group Art Unit: 2186	
)		
Filed: June 30, 2000)	Examiner: T. Thai	

For: CACHE HAVING A PRIORITIZE REPLACEMENT TECHNIQUE AND METHOD **THEREFOR**

HONORABLE COMMISSIONER FOR PATENTS, PO Box 1450 Alexandria, Virginia 22313-1450

APPEAL BRIEF

IN SUPPORT OF APPELLANTS' APPEAL TO THE BOARD OF PATENT APPEALS AND INTERFERENCES

Sir:

Appellant (hereafter "Appellant") hereby submits this Brief in triplicate in support of their Appeal from a final decision by the Examiner in the above-captioned case. Appellant respectfully request consideration of this Appeal by the Board of Patent Appeals and Interferences for allowance of the claims in the above-captioned patent application.

An oral hearing is not desired.

I HEREBY CERTIFY THAT THIS CORRESPONDENCE IS BEING DEPOSITED WITH THE UNITED STATES POSTAL SERVICE AS FIRST CLASS MAIL IN AN **ENVELOPE ADDRESSED TO:**

DIRECTOR OF THE UNITED STATES PATENT AND TRADEMARK OFFICE, WASHINGTON, D.C. 20231, ON: <u>DA September 2003</u> Date of Deposit

INTEL CORPORATION

Name of Assignee

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I. REAL PARTY IN INTEREST

The invention is assigned to Intel Corporation of 2200 Mission College Boulevard, Santa Clara, California 95052.

II. RELATED APPEALS AND INTERFERENCES

To the best of Appellant's knowledge, there are no appeals or interferences related to the present appeal that will directly affect, be directly affected by, or have a bearing on the Board's decision.

III. STATUS OF THE CLAIMS

Claims 1-22 are currently pending in the above-referenced patent application.

Claims 1-22 were rejected in the Final Office Action mailed on November 19, 2002 and are the subject of this appeal.

Claims 1-22 stand rejected under 35 U.S.C. §102(e) as being anticipated by Tischler et al. (US 2001/0049771 A1).

IV. STATUS OF AMENDMENTS

To the best of Appellant's knowledge, no amendments have been filed subsequent to the Final Rejection.

A copy of all claims on appeal, namely claims 1-22, is attached hereto as Appendix A.

V. SUMMARY OF THE INVENTION

Simply stated, this application is related to caches used is processing system, and more specifically, to techniques for replacing or loading data into a cache for future use. When the processor requests an instruction or a piece of data, the request may be compared against a tag array to determine if the data requested is stored in the cache. If a match is found in the tag array, then the stored information or data may then be provided by the cache. If the requested information is not in the cache, then a cache "miss" has occurred and the information may have to be retrieved from other sources.

In some applications, it may be desirable to arrange the cache into sub-regions, commonly referred to as ways. This may provide more efficient use of the cache since portions of the cache may be designated to store more frequently requested information. If a cache miss has occurred, the information is retrieved from a slower memory source and stored in one of the ways of the cache. Appellant's invention provides techniques for locking at least some of the ways of the cache so that the locked way is not victimized (i.e. erased) when the new data is put into the cache. Traditional techniques simply replace or victimize the way in the cache that was least recently used (LRU). However, Appellant's invention provides more sophisticated and efficient techniques to updated caches.

Although the scope of Appellant's invention is not limited in this respect, Appellant's specification states with reference to Appellant's fig. 2 "In this particular embodiment, the highest priority is given to a way (e.g., one of ways 31-34) that is locked, although the scope of the present invention is not limited in this respect. For example, a way that is locked is given higher priority over the most recently accessed way. Thus, LRU update controller 90 may indicate that a locked way is the highest priority (e.g., most recently used) even though it has not been accessed by processor 110 during one of the recent requests for information." (page 11, line 21, to page 12, line 2). By prioritizing the lock way higher, the contents of that particular way may be protected from being replaced or victimized.

Claim 1

A method for storing data in a cache (e.g. cache 50) comprising:

prioritizing a locked way (e.g. way 21 of fig. 2) of the cache (e.g. cache 50) higher than a recently used way (e.g. way 22).

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VI. ISSUES PRESENTED

- A. Whether claims 1-22 are unpatentable under 35 U.S.C. §102(e) as being anticipated by Tischler et al. (US 2001/0049771 A1) because Tischler fails to teach or suggest at least one feature of Appellant's invention.
- B. Whether claims 1-22 are unpatentable under 35 U.S.C. §102(e) as being anticipated by Tischler et al. (US 2001/0049771 A1) because Tischler fails to inherently teach at least one feature of Appellant's invention.

VII. GROUPING OF CLAIMS

For the purposes of this appeal:

Claims 1-22 stand or fall together as Group I.

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VIII. ARGUMENT

A. REJECTION OF CLAIMS 1-22 (GROUP I) UNDER 35 U.S.C. § 102(e) IN VIEW OF TISCHLER ET AL. IS IMPROPER. TISCHLER ET AL. DOES NOT EXPRESSLY MEET CLAIM LIMITATIONS DIRECTED TO "PRIORITIZING A LOCKED WAY HIGHER THAN A LEAST RECENTLY USED WAY."

The Final Office Action rejects claims 1-22 under 35 U.S.C. §102(e) as being anticipated by Tischler et al. (US 2001/0049771 A1

As is well-established, in order to successfully assert a *prima facie* case of anticipation, the Final Office Action must provide a single prior art document that includes every element and limitation of the claim or claims being rejected. Therefore, if even one element or limitation is missing from the cited document, the Final Office Action has not succeeded in making a prima facie case.

Appellant begins with claim 1, which recites, among other things, <u>prioritizing</u> a locked way of the cache higher than a recently used way. Appellant respectfully submits that Tischler et al. cannot anticipate Appellant's claims because, at a minimum, Tischler et al. does not teach or suggest locking a way, and/or then prioritizing the locked way higher than a recently used way as explained for the reasons below.

Tischler et al. contains no express teaching or suggestion of prioritizing

To begin, the portion of Tischler et al. relied upon by the Examiner in the Final Office Action, namely page 5, contains no express teaching of prioritizing locked ways higher than other ways. The text of Tischler doesn't even mention the terms "prioritize", "prioritizing" or any derivative thereof.

Although the scope of Appellant's invention is not limited in this respect, Appellant's specification states "In this particular embodiment, the highest priority is given to a way (e.g., one of ways 31-34) that is locked, although the scope of the present invention is not limited in this respect. For example, a way that is locked is given higher priority over the most recently accessed way. Thus, LRU update controller 90 may indicate that a locked way is the highest priority (e.g., most recently used) even though it has not been accessed by

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processor 110 during one of the recent requests for information." (page 11, line 21, to page 12, line 2). As is clear from this example, prioritization relates to the ordering of the ways and is not specifically limited to just locking a way to prevent it from being victimized as suggested by the Examiner during the interview.

Appellant respectfully points out that the relied upon portion of Tischler et al. does not contain any discussion of prioritizing, ranking, etc. of ways of a cache. Therefore, Tischler et al. cannot anticipate Appellant's claim 1 because Tischler et al. is devoid of the prerequisite teaching to establish a prima facie showing.

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B REJECTION OF CLAIMS 1-22 (GROUP I) UNDER 35 U.S.C. § 102(e) IN VIEW OF TISCHLER ET AL. IS IMPROPER. TISCHLER ET AL. DOES NOT AND CANNOT INHERENTLY MEET CLAIM LIMITATIONS DIRECTED TO "PRIORITIZING A LOCKED WAY HIGHER THAN A LEAST RECENTLY USED WAY."

The Final Office action has not made the perquisite showing to rely on inherency

As demonstrated above, Tichler et al. does not contain any express teaching or suggestion of prioritizing a lock way higher than a way to be victimized in accordance with Appellant's claim 1. Furthermore, Final Office Action has conceded at least this point as the Final Office action is relying on inherency to demonstrate that this feature is taught or suggested by Tischler et al.

In particular, the Final Office Action stated on page 5, paragraph 5, that "... one should realize realize [sic] that the way being locked (way 1) should have higher priority that [sic] the non-locking ways." In other words, the Final Office Action suggests that one skilled in the art may interpret the reference to teach prioritizing in accordance with Appellant's claim 1 even though Tischler et al. does not expressly teach this feature.

However, the Court of Appeals for the Federal Circuit has stated repeatedly, that Inherency "may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient." 948 F.2d at 1269, 20 USPQ2d at 1749 (quoting I n re Oelrich, 666 F.2d 578, 581, 212 USPQ 323, 326 (CCPA 1981))." Thus, in order to establish a prima facie showing, the Final Office Action must establish that Tischler et al. must teach prioritizing.

Appellant respectfully submits that, at a minimum, the rejection is improper because the Final Office Action has not demonstrated that the teaching or suggestion of prioritization must necessarily result. As explained above, and conceded by the Final Office Action, Tischler et al. does not contain any express teaching or suggestion of prioritizing or ranking. Since Tischler et al. does not teach this feature, Appellants respectfully submit that Tischler et al. cannot inherently disclose this feature. Thus, the Final Office Action's reliance upon inherency must be improper.

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Appellant would also like to point out that a discussion of prioritizing ways is only found in Appellant's specification, not Tischler et al. However, as is well established, it is improper to rely on Appellant's specification as a basis for inherency.

<u>Tischler et al. cannot inherently teach prioritization as this contrary to the express</u> teaching of Tischler et al.

The CAFC has also establish that a feature cannot be inherent if the feature is not consistent with the express teachings of the relied upon document. For example, the Court of Appeals for the Federal Circuit recently reversed an Examiner's rejection that was based in part on inherency. See, <u>In re Frank S. Glaug</u>, 2002 U.S. App Lexis 4246 (Fed Cir. 2002).

In the present case, Appellant would like to point out that Tischler et al. teach in paragraph 62 that a locked way is not prioritized higher than the other ways of the cache. Tischler et al. teach that a "least recently used" LRU indicator is used to determine which of the ways in the cache is the least recently used. Tischler et al. further teach that the LRU algorithm may even identify that a locked way is the least recently used way – "Locking down a Way means that the Way is never replaced <u>regardless</u> of the "least recently used" use indicator" (emphasis added.)

Further, Tischler et al. teach that because the way is locked, it is not victimized even though the locked way was identified by the LRU algorithm as being the least recently used way. In other words, Tischler et al. teaches that a locked way is not prioritized higher than the other ways when the LRU indicator is used, instead a locked way is considered by the LRU algorithm when determining what way in the cache is to be victimized. The LRU algorithm cannot prioritize the locked way as part of the analysis. Thus, Tischler et al. teach away from Appellant's claimed invention.

Since Tischler et al. teach away from a feature of Appellant's claim 1, it cannot inherently teach prioritization as suggested by the Final Office Action. Appellant would also like to kindly point out that claims 13 and 20 recite prioritizing as well. Thus, these claims, along with the corresponding dependent claims, cannot be anticipated by Tischler et al. for at least the same reason.

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Thus, Appellant respectfully submits that Tischler et al. cannot anticipate Appellant's claims 1-22 for at least these reasons.

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IX. CONCLUSION

Appellants respectfully submit that all the pending claims in this patent application are patentable and request that the Board of Patent Appeals and Interferences overrule the Examiner and direct allowance of the rejected claims.

This brief is submitted in triplicate, along with a check for \$320.00 to cover the appeal fee for one other than a small entity as specified in 37 C.F.R. § 1.17(c). Plæse charge any shortages and credit any overcharges to Deposit Account No. 02-2666.

Respectfully submitted,

Date: 9-22-03

Kenneth M. Seddon

Attorney for Appellants

Registration Number: 43,105

to get Soldon

Blakely, Sokoloff, Taylor & Zafman 12400 Wilshire Boulevard Seventh Floor Los Angeles, CA 90025-1026

(408) 720-8598

X. APPENDIX A: CLAIMS ON APPEAL

- A method for storing data in a cache comprising:
 prioritizing a locked way of the cache higher than a recently used way.
- 2. The method of claim 1, further comprising storing data in the recently used way.
- 3. The method of claim 1, further comprising: prioritizing the locked way higher than a least recently used way; and storing data in the least recently used way.
- 4. The method of claim 1, further comprising locking at least one way of the cache to provide the locked way.
- 5. The method of claim 1, further comprising reading data from a way of the cache prior to prioritizing the locked way, the way being the recently used way.
- 6. The method of claim 1, wherein prioritizing the locked way includes setting a bit in a register.
- 7. The method of claim 1, further comprising setting a bit in a register to indicate priority of the recently used way.
- 8. The method of claim 1, further comprising writing data to a way of the cache prior to prioritizing the locked way, the way being the recently used way.
 - 9. The method of claim 1, further comprising: locking a first way of the cache to provide the locked way; and locking a second way of the cache to provide an additional locked way.

- 10. The method of claim 9, further comprising prioritizing the locked way higher than the additional locked way.
 - 11. The method of claim 9, further comprising:
 setting a first bit in a register to indicate priority of the locked way; and
 setting a second bit in a register to indicate priority of the additional locked way.
- 12. The method of claim 11, further comprising setting a third bit in a register to indicate priority of the recently used way.

13. A method comprising:
locking a first way of a cache;
accessing a second way of the cache;
accessing a third way of the cache;
prioritizing the first way of the cache higher than the second way of the cache; and
writing data to the second way of the cache

- 14. The method of claim 13, wherein locking the first way includes setting a bit in a register to indicate the priority of the first way.
- 15. The method of claim 13, wherein writing data to the second way occurs if the second way has been accessed more recently than the first way.
- 16. The method of claim 15, wherein writing data to the second way occurs if the second way has been accessed more recently than the third way.

17. An apparatus comprising a cache having a first way and a second way, the apparatus comprising:

a circuit adapted to write data to the first way if the first way has been accessed more recently than the second way.

- 18. The apparatus of claim 17, wherein the circuit if further adapted to lock the second way.
- 19. The apparatus of claim 17, further comprising a memory location adapted to indicate the priority of the first way and the second way.

20. An article comprising:

a machine readable storage medium having stored thereon instructions capable of being executed by a data processing platform, said instructions being adapted to prioritize a locked way of a cache higher than a least recently used way of the cache.

- 21. The machine readable storage medium of claim 20, wherein said instructions are further adapted to set a bit in a memory location to indicate the priority of the locked way and the least recently used way.
- 22. The machine readable storage medium of claim 21, wherein said instructions are further adapted to store data in the least recently used way.

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